

**TOTAL ORGANIC CARBON (TOC) in SOIL**  
SW-846 Method 9060

**Table 1. Summary of Contract Required Detection Limits, Holding Times, and Preservation for Total Organic Carbon (TOC) in Soil**

Analytical Parameter	Contract Required Detection Limit (CRDL)	Technical and Contract Holding Times	Preservation
Total Organic Carbon (TOC)	200 mg/Kg	Technical: 28 days from collection; Contract: 26 days from receipt at laboratory	Cool to 4°C ±2°C; protect from sunlight and atmospheric oxygen

Homogenize samples by shaking, stirring, and/or pulverizing using a blender. Using a separate portion of the sample, analyze for percent solids. Remove inorganic carbon by the addition of several drops of 1:1 nitric acid to a pH < 2. Dry samples in a drying oven to drive off CO<sub>2</sub>. Allow 10 to 30 minutes drying time.

Analyze all samples in duplicate, including laboratory quality control samples such as matrix spike and laboratory control samples (LCS). Report the average value and relative percent difference.

The CRDL is 200 mg/Kg. Results should be reported down to the instrument detection limit, if lower than the CRDL.

**Data Calculations and Reporting Units:**

Calculate the sample results according to Section 8 of SW-846 Method 9060.

Report sample results in concentration units of milligram per kilogram (mg/Kg) of organic carbon on a dry weight basis. Calculate sample results according to the following formula:

$$A = (B \times 100,000) \div (C \times D)$$

Where A = concentration of TOC in mg/Kg (dry weight basis); B = TOC measured, in Fg; C = Sample size, in mg; D = % Solids

Report organic carbon concentrations that are less than 10 mg/Kg to 2 significant figures, and organic carbon concentrations that are greater than or equal to 10 mg/Kg to 3 significant figures.

For rounding results, adhere to the following rules:

- a) If the number following those to be retained is less than 5, round down;
- b) If the number following those to be retained is greater than 5, round up; or
- c) If the number following the last digit to be retained is equal to 5, round down if the digit is even, or round up if the digit is odd.

All records of analysis and calculations must be legible and sufficient to recalculate all sample concentrations and QC results. Include an example calculation in the data package.

**Table 2. Summary of Calibration Procedures for Total Organic Carbon (TOC) by SW-846 Method 9060**

Calibration Element	Frequency	Acceptance Criteria	Corrective Action
Initial Calibration (minimum blank + 5 points) (ICAL)	Daily	$r \geq 0.995$	<ol style="list-style-type: none"> <li>1. Terminate analysis</li> <li>2. Recalibrate and verify before sample analysis</li> </ol>
Initial Calibration Verification (ICV) (Separate source from ICAL standards)	Daily, prior to sample analysis, immediately following ICAL	$\pm 10\%$ from expected concentration	<ol style="list-style-type: none"> <li>1. Reprep ICV and, reanalyze all associated samples</li> <li>2. Identify and document problem</li> <li>3. Recalibrate and reanalyze repped ICV and all associated samples, if necessary</li> </ol>
Continuing Calibration Verification (CCV) <sup>a</sup>	Before sample analysis; after every 10 samples and end of run	$\pm 10\%$ from expected concentration	<ol style="list-style-type: none"> <li>1. Recalibrate and verify</li> <li>2. Reanalyze samples back to last good CCV</li> </ol>
Calibration Blank Verification (ICB, CCB)	After ICV and CCVs	< CRDL	<ol style="list-style-type: none"> <li>1. Terminate analysis</li> <li>2. Identify and document the problem</li> <li>3. Recalibrate, verify and reanalyze all associated samples</li> </ol>
CRDL Verification Standard (< 2X CRDL)	After initial CCV	$\pm 20\%$ from expected concentration	<ol style="list-style-type: none"> <li>1. Reprep and reanalyze standard</li> <li>2. Recalibrate and verify</li> </ol>

<sup>a</sup> The CCV must be at a different concentration than the ICV.

Dilute and reanalyze samples with TOC concentrations exceeding the range of the calibration curve. Results for such reanalyses should fall within the mid-range of the calibration curve. Report results and submit documentation for both analyses.

Use between 10 and 50 mg of soil sample for analysis. Reanalyze using a smaller sample size if the TOC concentration in a 10 mg sample exceeds the calibration range.

**Table 3. Summary of Internal Quality Control Procedures for Total Organic Carbon (TOC) by SW-846 Method 9060**

QC Element	Frequency	Acceptance Criteria	Corrective Action
Method Blank (MB)	One per Batch or SDG <sup>a</sup> (1 per 20 samples minimum)	< CRDL	<ol style="list-style-type: none"> <li>1. If lowest sample concentration is more than 10X the blank conc., no action</li> <li>2. If samples are non-detected, no action</li> <li>3. If detected sample concentrations are less than 10X blank conc., all associated samples must be prepared again with another method blank and reanalyzed</li> </ol>
Duplicate Sample (DUP)	All samples in the batch or SDG	RPD <20% for samples >5X CRDL; ± CRDL for samples <5X CRDL	<ol style="list-style-type: none"> <li>1. Flag associated data with an "*"</li> </ol>
Matrix Spike (MS)	One per batch or SDG (1 per 20 samples minimum)	± 25% from expected value <sup>b</sup>	<ol style="list-style-type: none"> <li>1. Flag associated data with an "N"</li> </ol>
Laboratory Control Sample (LCS)	One per batch or SDG (1 per 20 samples minimum)	± 20% from expected concentration	<ol style="list-style-type: none"> <li>1. Terminate analysis</li> <li>2. Identify and document the problem</li> <li>3. Reanalyze all associated samples</li> </ol>

<sup>a</sup> SDG - Sample Delivery Group - each case of field samples received; or each 20 field samples within a case; or each 14 calendar day period during which field samples in a case are received.

<sup>b</sup> An exception to this rule is granted in situations where the sample concentration exceeds the spike concentration by a factor of 4. In such an event, the data shall be reported unflagged.

Analyze all samples in duplicate, including MS, LCS, and blanks. Report the average and relative percent difference of the results for duplicate analysis.